

US EPA ARCHIVE DOCUMENT

1. CHEMICAL: Avermectin
2. FORMULATION: L - 676, 863 0.03 lb. AI/gal water soluble liquid
3. CITATION: Atkins, E.L. 1981. Letter to Dr. John G. MacConnell and attached data. Tab C2f in EPA Acc. No - 252115. Submitted by Merck, Sharp, and Dohme, December 28, 1983.
4. REVIEWER: Allen W. Vaughan  
Entomologist  
EEB/HED
5. DATE REVIEWED: February 7, 1984
6. TEST TYPE: Honey bee - toxicity of residues on foliage
  - A. Test species: Honey bee (Apis mellifera)
7. REPORTED RESULTS:

Citrus

Bees were caged on treated foliage. Results are presented in the following table:

TABLE 1 - 1981 Honey Bee-Pesticide Tests in Citrus Valencia Oranges in California. Mortality of Bees in Foliage Residue Bioassay Tests.

Plot No.	Treatment Pesticide & Dosage, (oz ai/100 gal)	Percent Mortality of Bees from Residues: Age of Citrus Foliage Residues, Hours Posttreatment: <sup>1/</sup>					
		1	4	8	24	48	72
6/81	avermectin (0.03 lb B 1/gal) (L-676,863-28W02) (0.2)	100	86.00	91.92	96.03	30.39	8.49
7/81	avermectin (0.1)	100	78.64	71.29	57.73	13.73	-
8/81	avermectin (0.1) + 0.25% narrow range 412-415 citrus spray oil	100	56.38	25.47	28.71	6.00	-
9/81	avermectin (0.04)	97.87	44.00	21.49	16.83	5.83	-
10/81	Untreated Check	4.90	5.05	3.88	5.76	10.68	3.74

<sup>1/</sup>Mortality counts made after 24 hours of exposure.

As indicated in the table, Avermectin at all rates tested remained highly toxic through 1 hr posttreatment. At the highest rate tested, residues remained highly toxic through 24 hr. At the lowest rate, toxicity decreased to moderate after 4 hr, and to low after 24 hr. The author concluded that these applications would be safe to honey bees foraging in the trees 48 hours post-treatment.

#### Seed alfalfa

Bees were caged on treated foliage. Results are presented in the following table.

TABLE 2 - 1981 Honey Bee-Pesticide Tests in Seed Alfalfa in California.  
Mortality of Bees in Foliage Residue Bioassay Tests.

Plot No.	Treatment Pesticide & Dosage, (lb ai/A)	Percent Mortality of Honey Bees From Residues: Age of Alfalfa Foliage Residues, Hours Posttreat.: <sup>1/</sup>							
		0.5	2	4	8	24	36	48	60
44/81	Untreated Check	0	0	0	0	0	0	0	0.97
40/81	avermectin (0.3 lb ai B <sub>1</sub> / gal) (L-676,863- 28W02) (0.0125)	92.22	79.29	0	0	0	-		
41/81	avermectin (0.025)	99.00	93.98	46.32	6.90	0	-		
42/81	avermectin (0.050)	100	98.86	93.55	85.19	23.81	00.94	-	
43/81	avermectin (0.10)	100	100	100	100	99.03	57.29	7.22	0

<sup>1/</sup> Mortality counts made after 24 hr of exposure.

As indicated in the table, all rates tested remained highly toxic through 2 hr posttreatment. At the two lower rates, toxicity decreased to low after 8 hours. The two higher rates remained highly toxic 8 to 24 hours posttreatment.

#### 8. REVIEWER'S CONCLUSIONS:

This study is scientifically sound, and shows that foliar residues of avermectin may remain toxic to honey bees for as long as 2 days following application.

## Materials and Methods

### Test Procedures

#### Citrus

Each plot had 4 one-tree replicates. Application (12.5 gal/tree) was made with hand-held spray gun using a citrus spray rig. Foliage was sampled from the trees, chopped and mixed, and placed in cardboard cages. Each of 4 replicate cages had approximately 25 bees added after foliage sample was placed in cage. Bees were in continuous contact with foliage for 24 hours. Cages were held at 80 F. and 65% RH. Bee mortality counts were made after 24 hours.

#### Seed alfalfa

Each 0.01 acre plot was hand sprayed at the rate of 25 gal material per acre. Samples of alfalfa foliage were chopped, mixed, and placed in cardboard cages. Each of the 3 replicate cages had 25-35 bees added per cage after foliage samples were placed in cages. Bees were in continuous contact with foliage for 24 hours. Bee mortality was recorded after 24 hours.

### Statistical Analysis

None reported.

### Discussion/Results

At highest rates tested, avermectin residues remained toxic as long as 36 hours. At lowest rates tested, residual toxicity decreased to low within 4 to 8 hours.

### Reviewer's Evaluation

#### A. Test Procedures

Procedures were sound.

#### B. Statistical Analysis

None reported.

#### C. Discussion/Results

This study is scientifically sound.